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ABSTRACT

Funded by the Women's Educational Equity Act Programs, the Minneapolis Public Schools Indian Education Section on October 1, 1981, began a study to assess the present level of enrollment and performance of Minnesota Indian girls in junior and senior high school mathematics courses. Procedures in conducting the study included: identifying 7 to 10 school districts to cooperatively participate; gathering information on enrollment of Indian girls in various mathematics courses offered by districts; acquiring information on the performance of Indian girls in mathematics courses; analyzing existing data, including the Minnesota School Affect Assessment, to determine attitudes of Indian girls towards mathematics; and surveying cooperating school districts and Indian parent groups about special programs assisting Indian girls with mathematics. Results of data analysis revealed: cooperating school districts lacked complete consistency in determining Indian students; a higher dropout rate among Indian students; a drop in math enrollment at the senior high level (100% for grades 7-9 to 33% for grades 10-12) due to lack of state requirements and school district policies which make mathematics courses elective; a need for special programs designed to encourage more students to enroll in advanced mathematics courses; and Indian females were proportionately underrepresented in math classes. (ERB)

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MINNESOTA INDIAN GIRLS AND MATH

Final Report

Minneapolis Board of Education

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MINNESOTA

INDIAN GIRLS

AND MATH

FINAL REPORT

This is the final report of a project entitled "Educational Equity for Minnesota Indian Girls: Assessment and Planning for Special Mathematics Programs," a grant to the Indian Education Section of the Minneapolis Public Schools from the Women's Educational Equity Act Programs, 1981-82.

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November, 1982

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MINNESOTA INDIAN GIRLS AND MATH

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1.0 Background and Need for the Project

The failure of the public schools in this country to effectively educate American Indian children has been well documented. Published reports suggest that three quarters of all Indian children are at least one grade level behind for their age, over one-half of Indian students drop out of school, and, on the average, Indian students fall farther and farther behind as they progress through school until finally they are three to four years behind in school achievement by graduation.

Studies have shown that Indian students have serious doubts about their adequacy, view themselves as inferior to whites, and have feelings of alienation, anxiety, and inadequacy. Several researchers have suggested that minority students have low self-concepts and that low self-concept is related to low academic achievement.

Still, the evidence on the self-concept of Indian students is not conclusive. A second body of research suggests that self-concept does not relate to academic achievement among Indians and that, in fact, Indian students tend to feel quite good about themselves as persons, if not about themselves as students. Perhaps the key to understanding these two points of view is that too often when educators talk about self-concept they are not referring to adjustment within the personality domain but rather about student attitudes toward classroom climates. If this is indeed the case, then it is possible that Indian children may feel good about themselves as persons and yet feel uncomfortable about themselves in relation to the schools.

Certain child-rearing practices which are unique to Indians may contribute to the formation of values and behaviors which are often misinterpreted by non-Indians in the school setting and contribute to the discomfort Indian students feel about themselves as students.

Perhaps the most noticeable cultural difference between Indians and whites is that, when faced with a new and anxiety-producing situation, whites react with much activity. They talk, ask questions, and proceed in a fashion which can be characterized as aggressive experimentation. Indians, on the other hand, react to those situations by becoming motionless and observing until they can perceive what is expected of them. This behavior in a school situation is sometimes mistaken for dullness or lack of interest in what is being presented. Furthermore, Indians are very reluctant to exhibit ineptitude in front of others. Thus, school situations which require students to volunteer to answer questions or solve problems in front of their peers are often perceived as much more threatening and embarrassing situations by Indian children than by white children. From very little on, Indian children are taught not to interfere or bother older people when they appear to be busy. It is, therefore, quite contrary to what they have learned, for Indian children to consider raising their hands and interrupting a teacher who is speaking to a class. Interference is considered so socially inappropriate that Indian children are taught to withdraw from situations in which someone is acting in an interfering manner. By withdrawing, the child is taught that he/she will avoid embarrassing the interferer by witnessing the inappropriate behavior. No doubt, much of what occurs in a typical classroom might be considered interfering and inappropriate by Indian standards and, although they are unable to physically leave, many Indian children react by withdrawing from participation in and identification with classroom activities.

Although cultural differences are probably not solely responsible for the poor school performance of Indian children, they may play an important part. Whatever the complex set of causes, the result of the

failure of the educational system produces clear effects. One effect is a very low number of American Indian professionals. Only one-tenth of one percent of all public school teachers are Indian, only seven-hundreths of one percent of all engineers are Indians, and only four-hundreths of one percent of all psychology Ph.D.s and medical doctors are Indian.

Clearly women, especially minority women, are socially and economically disadvantaged relative to white men. Harley (1978) states, "the objective position of women in the labor force is typically even more disadvantaged than is true for men of Black, Mexican American, Puerto Rican, Cuban, or Indian heritage. The women of all these minority groups (except at the very highest educational levels) are doubly disadvantaged. . ." (pp. 125-26).

One reason this continues to be true is that minorities and women are significantly less prepared for some careers. For jobs in many fields, mathematics is the "critical filter" which keeps down the percentage of minorities and women. Even very recent national data suggests that minority youngsters are still not enrolling in high school math and science courses in the same proportion as their majority classmates (see Figure 1).

While differences in mathematics test performace between men and women have long been observed, recent research suggests that those observed differences are not innate but, rather, are the product of the complex interaction of socialization, education exposure, and attitudes. It is within the context of the data and research briefly reviewed above that the Indian Education Section submitted its proposal for funding to the Women's Educational Equity Act Programs in January, 1981.

FIGURE 1

RECENT NATIONAL DATA
ON PARTICIPATION IN HIGH SCHOOL
MATHEMATICS AND SCIENCE,
BY RACIAL/ETHNIC GROUP

	Racial/Ethnic Group				
	American Indian	Black	Hispanic	Asian American	White
Semesters of High School Math, grades 10-12					
. 0-2	63.2%	42.2%	43.7%	23.1%	36.7%
. 3-5	25.9%	38.4%	39.0%	29.4%	33.3%
. 6 or more	10.9%	19.4%	17.3%	47.6%	30.0%
. Average semesters	2.6	3.4	3.3	4.6	3.8
1980 High School Seniors Taking Three Years or More Math and Science					
. Mathematics	22%	35%	27%	48%	33%
. Science	12%	19%	14%	32%	23%
1980 High School Seniors Taking Math and Science, By Course Title					
. Algebra I	61%	68%	67%	88%	81%
. Algebra II	32%	39%	38%	76%	50%
. Geometry	34%	38%	39%	79%	60%
. Trigonometry	17%	15%	15%	50%	27%
. Calculus	5%	5%	4%	22%	8%
. Physics	17%	19%	15%	35%	20%
. Chemistry	24%	28%	26%	59%	39%

These data are adapted from "Blacks in Mathematics: The State of the Art," a paper by Martin L. Johnson of the University of Maryland. The paper was presented at the Equity in Mathematics Core Conference, sponsored by the National Council of Teachers of Mathematics, Reston, Virginia, February 19-21, 1982.

2.0 Scope of Proposed Activities

The Minneapolis Public Schools Indian Education Section requested single year funding from W.E.E.A. A total of $24,914 was received for project activities over a twelve-month period beginning October 1, 1981. Later, a 60-day, no-cost extension was negotiated, making the total grant period fourteen months.

Research into the behavior of Indian students presents a series of very special problems. The most important of these problems is the negative climate toward testing and research which exists within the Indian community. These feelings are based largely on what Indians perceive to be years of inappropriate research, mostly anthropological, which was done on Indians without their informed consent and without producing any changes perceived as good by the Indians who were the subjects of those studies.

This first problem is compounded by the fact that there are very few Indian people trained to conduct research. Most often, then, research projects are implemented by non-Indian professionals who have not dedicated the time necessary to building trust relationships with the Indian community. Well-meaning non-Indian professionals are handicapped in their efforts to conduct research not only by the small number of Indian colleagues but also by the small number of Indian adults who have been exposed to and feel comfortable with the language and methods of research.

Because the research climate was perceived to be somewhat difficult and because the amount of the grant was small, the objectives of the project were modest. Proposed were activities to assess the present level of enrollment and performance of Minnesota Indian girls in junior and senior high school mathematics courses, analyze existing data about

the attitudes of those girls towards mathematics, assess the extent to which special programs now exist for Minnesota Indian girls in mathematics, develop community involvement and interest in research and programs in this area, and finally develop a series of recommendations and proposals for both research and direct-service projects to improve the success of Minnesota Indian girls in mathematics over a three to five year period.

Because of the nature of the activities proposed, it was not possible to state objectives which meet the strict definition for objectives, i.e., "x% of the students (or teachers) will demonstrate y% improvement in behavior z by the end of period w." Instead, the following series of pseudo-objectives for the project were developed:

1. To identify at least seven to ten school districts which will agree to cooperatively participate in this project.
2. To gather information on the enrollment of Indian girls at the junior and senior high school levels in the various mathematics courses offerred by the districts.
3. To gather information on the performance of Indian girls in mathematics courses.
4. To analyze existing data, including, but not limited to, the Minnesota School Affect Assessment, in order to determine what is already known about the attitudes of Indian girls towards mathematics and toward related variables.
5. To survey the cooperating school districts and Indian parent groups in those districts about special programs which exist in order to assist Indian girls with mathematics.
6. To communicate the preliminary results of the assessments described in objectives 1-5 to Indian parents, students, and educators.

7. To design and submit, with the cooperation of the Indian community, at least two proposals for three to five year funding, one for additional basic research and one for new direct-service programs.

When the proposal for this project was developed, it was expected that two members of the Indian Education Section staff would implement the activities. Those two were Elizabeth Whiteman Runs Him, a Crow Indian, and Jan Witthuhn, a non-Indian. Administrative leadership would be provided, at no cost to the project, by Rosemary Christensen, Chippewa, Director of Indian Education for the Minneapolis Public Schools.

Shortly after funding for this project was received, Ms. Whiteman Runs Him resigned her position with the Minneapolis Public Schools. Rather than being replaced, her responsibilities were divided among several people already on the Indian Education staff, including Mrs. Christensen, who assumed a more active role than had originally been anticipated. Others who assisted with project activities were Sharon Blackhawk, Chuck Robertson, Jr., Steve Premo and Don Allery.

3.0 Minnesota Indian Demography

The 1980 census indicates that there are approximately 35,000 American Indian people living in Minnesota. This represents about 1% of the state's total population. In the fall of 1981, State Department of Education data indicates there were 10,972 Indian students in Minnesota Public Schools. Indian students made up 1.5% of the state's total public school enrollment.

Minnesota's Indian population is nearly evenly divided between urban and rural areas. Nearly 45% live in the Twin Cities (Minneapolis - St. Paul) metropolitan area alone. Figure 2 indicates the proportion of Minnesota Indians living in urban centers, in the northern concentration of counties near the major reservations, and in the remainder of the state.

The numbers of urban Indians in Minnesota have grown rapidly over the past thirty years. Many families leave the reservations and come to the cities in search of employment and better housing. Too often those hopes are not realized and urban Indian unemployment is high. Movement between the reservations and urban centers and back to the reservations is continuous. During 1981-82, for example, Minneapolis Public School data indicates that 41% of all Indian students attended more than one school that year. This compared with 21% of the white students.

Figure 3 is a map of Minnesota on which the state's metropolitan areas as well as the Chippewa reservations and Sioux communities are indicated. Although the Red Lake Reservation is solidly Indian-owned, the other reservations are not. They have been describes as ". . . a crazy quilt of Indian tribal lands bought back or reverted after the Indian Reorganization Act, Indian trust allotments, county, state and U.S. Forest land, and fee-patented property. Little towns with mainly

FIGURE 2

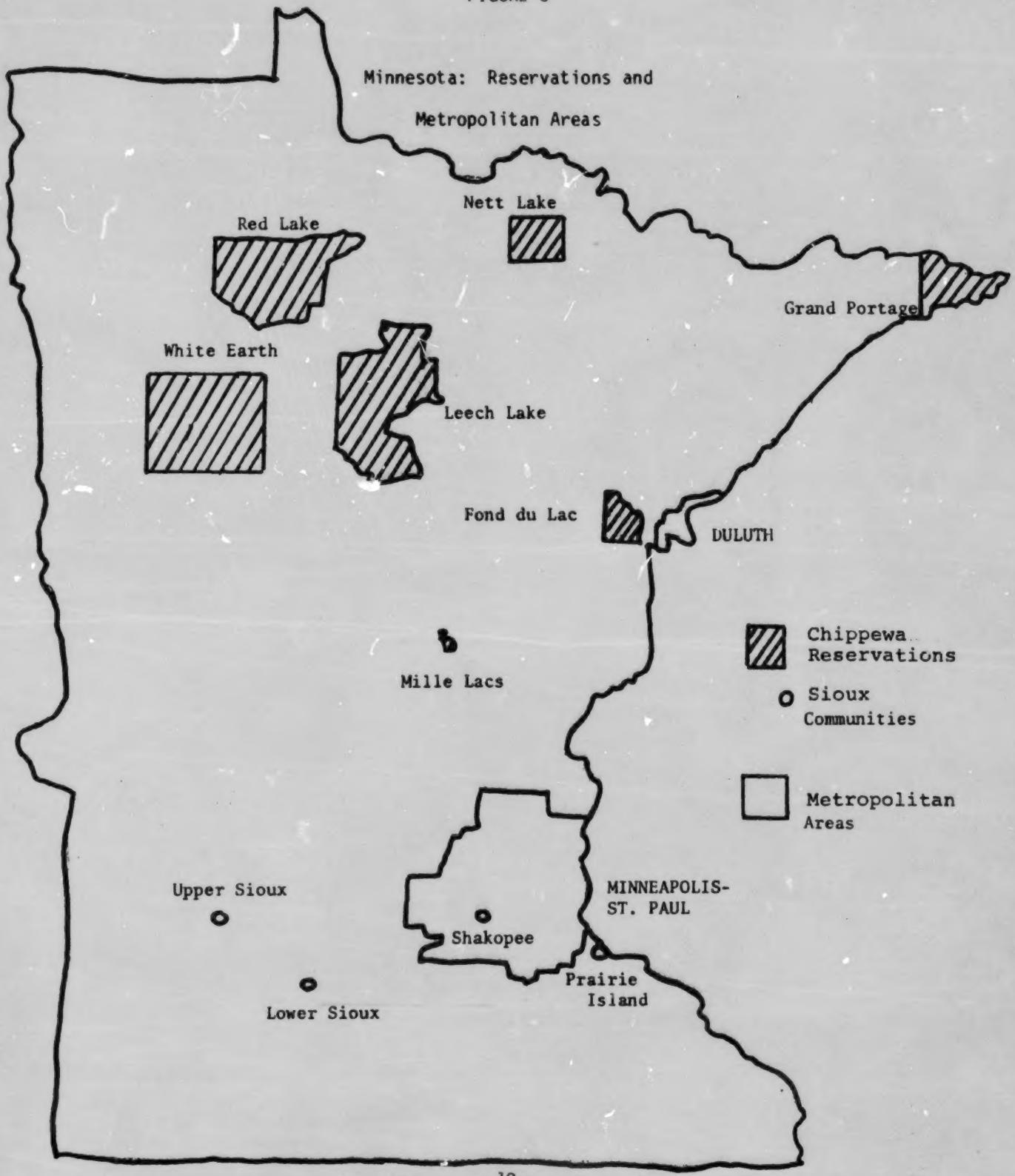
1980 MINNESOTA
AMERICAN INDIAN POPULATION
DISTRIBUTION

	Urban Counties (8) (Twin Cities Metro and Duluth)	Northern Concentration Counties (8)	Other Counties (71)
Number of Indian People (1980 Census)	18,480	14,294	2,252
Percent of Total	52.8%	40.8%	6.4%

State Total - 35,026
Total Percent - 100%

These data provided by the Minnesota State Department of Education.

FIGURE 3


Minnesota: Reservations and
Metropolitan Areas
Nett Lake
Red Lake
Grand Portage
White Earth
Leech Lake
Fond du Lac
DULUTH
Mille Lacs
Chippewa Reservations
Sioux Communities
Metropolitan Areas
Upper Sioux
MINNEAPOLIS-ST. PAUL
Shakopee
Prairie Island
Lower Sioux

white-owned businesses dot the landscape. White-owned resorts and vacation cabins sit on leased Indian trust lands" (League of Women Voters of Minnesota, 1971, p. 27.) Trust allotment acreage which reached a post-IRA high of about 890 thousand acres has now been diminished to only about 50 thousand acres in Minnesota. A brief description of each of the Chippewa reservations and Sioux communities in the state follows. Information comes from the League of Women Voters of Minnesota, the 1980 census, and 1981 BIA data.

3.01 Leech Lake Reservation

The Leech Lake Reservation is located in north-central Minnesota and encompasses parts of Beltrami, Itasca, and Cass counties. Much of the reservation land is now owned by units of government and is part of the Chippewa National Forest. There are many lakes and swamps, and much of the remaining land is cut-over forest not suitable for farming. There were 4,034 Indian people living on the Leech Lake Reservation in 1981. Of the 2,608 who were 16 or older, 17% were employed in jobs in which they earned $7,000 per year or more (the annual salary of a worker earning minimum wage). Of those at least 16 years old and able to work, 54% were unemployed. Indian people live in Ball Club (unincorporated), Bena (pop. 153), and Cass Lake (1,001) on the reservation, and in the somewhat larger towns of Walker (pop. 970), Bemidji (10,949), and Grand Rapids (7,934) off the reservation.

3.02 White Earth Reservation

Although originally made up of thirty-six townships in Becker, Clearwater, and Mahomen counties in northwestern Minnesota, only a very small percentage of the White Earth Reservation is still Indian-owned trust land. Much of the richest Red River Valley farmland which was originally Indian-owned has passed to whites. In 1981, 3,948 Indian

people lived on the White Earth Reservation. Many live in the towns of Naytahwaush, White Earth, and Ponsford (all unincorporated), and Mahnomen (pop. 1,283) on the reservation, and the nearby off-reservation towns of Bagley (1,321), Park Rapids (2,976), and Detroit Lakes (7,106).

Of the 2,411 Indian people 16 or older on the White Earth Reservation, 17% were employed in jobs paying at least $7,000 per year. Of those able to be part of the labor force, 69% were unemployed in 1981.

3.03 Fond du Lac Reservation

The Fond du Lac Reservation includes parts of Carlton and St. Louis counties and is located only about twenty miles from Duluth. The resident Indian population of Fond du Lac is 1,431 with 912 people 16 or older. Of those 16 or older, 20% are employed and earn at least $7,000 per year. Of those adults able to work, 40% are umemployed. Small towns on or near the Fond du Lac Reservation include Sawyer (unincorporated), Brookston (pop. 124), Carlton (862), and Cloquet (11,142).

3.04 Nett Lake Reservation

The Nett Lake Reservation, also known as the Bois Forte Reservation, is located in an isolated and undeveloped section of north-central Minnesota only about sixty miles south of the boarder with Canada. It includes lands in Koochiching and St. Louis counties and has an Indian population of 940. The only town on the reservation is Nett Lake which is an unincorporated village. The nearest city is Virginia (pop. 11,056), located about 75 miles away. The unemployment rate among Indians living on the Nett Lake Reservation was estimated at 58% in 1981, with only 11% of the adult Indian population employed in jobs paying $7,000 or more per year.

3.05 Mille Lacs Reservation

The Mille Lacs Reservation is located in central Minnesota on the shores of Lake Mille Lacs. The tribe owns several miles of shoreline in a popular recreation and vacation area. Most of the Indian-owned land is near the unincorporated village of Vineland. Other nearby towns include Onomia (pop. 691), Garrison (174), and Isle (573). The resident Indian population in 1981 was 879 people. Unemployment was estimated at 51%. Of the adult Indian population, 26% were employed in jobs with salaries of $7,000 or more per year.

3.06 Grand Portage Reservation

The Grand Portage Reservation is located in Cook County on the north shore of Lake Superior. The northern edge of the reservation is the Canadian boarder. Because of the historical significance of the area as the oldest non-Indian settlement in the state, dating back to the 1700s, tourists are attracted to the area. Tribal enterprises have attempted to capitalize on the tourist trade. In 1981, the reservations resident Indian population numbered 310, with 34% of the adults earning more than $7,000 per year. 1981 unemployment among the reservation's Indian labor force was estimated at 34%. Besides the unincorporated village of Grand Portage, tribal members also live in Grand Marais (pop. 1,289) which is located forty miles south of the reservation. Secondary students living on the reservation are bused to Grand Marais daily to attend school.

3.07 Red Lake Reservation

The Red Lake Reservation is unique among Chippewa reservations in Minnesota. The land was never ceded by treaty, has not been alloted, and continues to be held in common. The Red Lake Reservation is located in north-central Minnesota in Beltrami and Clearwater Counties. BIA data estimates the 1981 resident Indian population on this reservation

at 4,399. Many of these people live in the three unincorporated reservation villages of Red Lake, Redby, and Ponemah. The nearest large town is Bemidji (pop. 10,949) located about 30 miles south. In 1981, unemployment on the Red Lake Reservation was estimated at 41%. About 30% of the adult Indian population earns more than $7,000 per year.

3.08 Lower Sioux Community

The Lower Sioux Community is located along the Minnesota River near the town of Morton (pop. 549) in southwestern Minnesota. The land is considered to be very fertile farm land. In 1981, the BIA resident reported that the Indian population for this community is 209 people. Unemployment is estimated at 40%.

3.09 Upper Sioux Community

This Sioux Community, located not far from the Lower Sioux Community, lies on both sides of State Highway 67. The nearest town is Granite Falls (pop. 3,451). The community's population is 127, with unemployment estimated at 53%.

3.10 Prairie Island Sioux Community

The Prairie Island Sioux Community is located along the Mississippi River in southeastern Minnesota's Goohue county. About 118 Indian people live at Prairie Island. Unemployment is estimated at 42%, with many who are employed working in nearby Red Wing (pop. 13,736).

3.11 Shakopee Mdewakanton Sioux Community

This is the smallest of the Sioux Communities with a population of 98 Indian people. The community is located at Prior Lake (pop. 7,284) and is only 15 miles south of the Twin Cities.

4.0 Project Implementation

4.01 Identification of School Districts

The staff began implementation of project activities by reviewing the demography of the state's Indian population in order to select school districts for initial contacts. The use of a strict statistical procedure such as stratified ramdom selection was rejected as impractical and unnecessary. It was, however, judged to be important to select urban, suburban, and rural school districts; on-reservation and off-reservation districts; districts serving different geographical areas of the state; districts serving different tribes; and districts in which Indian students attended in large enough numbers to be significant.

The goal was to identify seven to ten districts which would agree to participate in this project. Anticipating that not all districts initially contacted would choose to participate, the staff decided to send introductory letters to superintendents of twelve public school districts and to the principal of one nonpublic, tribally-controlled school. Figure 4 lists the districts contacted along with some data about each one. Figure 5 presents 1980 census data about the counties and municipalities served by these school districts. Although the districts which were contacted were subjectively selected, they do enroll nearly half of the state's American Indian students, and the counties served by those districts are populated by almost three quarters of the states Indian people (see Figure 6).

4.02 Contacts with School Districts

Initial contact with school districts was made by letter sent to the superintendents (see Figure 7). The letter was accompanied by a postcard to encourage a timely response. Of the 13 districts contacted, 11 responded positively. No response was received from either Sandstone

FIGURE 4
DISTRICTS CONTACTED FOR WEEA STUDY
(Data from 1981-82 Minnesota Educational Directory and State Department of Education)

School District	Superintendent/ Telephone	Mailing Address	Total Enroll.	Indian Enroll.	Number of Schools	County
Anoka	Lewis Finch 612/755-8220	11299 Hanson Blvd. Coon Rapids 55433	30,854	348 1.1%	25 Elem.; 1 Middle 5 Jr.; 3 Sr.	Anoka
Bagely	Albert Toriseva 218/694-6586	308 N. Bagley Ave. Bagely, MN 56621	1,471	237 17.3%	2 Elementary 1 Secondary	Clearwater
Bemidji	Clinton Barter 218/751-2160	15 St. & Beltrami Bemidji, MN 56601	4,495	327 7.3%	8 Elem.; 1 Jr.; 1 Sr.	Beltrami
Cook County	Warren Rolek 218/387-2271	Box F Grand Marias 56604	749	53 7.1%	3 Elementary 1 Secondary	Cook
Duluth	Richard Pearson 218/723-4150	Lake Ave. & 2nd St. Duluth, MN 55802	15,364	394 2.6%	25 Elem.; 5 Jr.; 1 Sec.; 3 Sr.	St. Louis
Mahnomen	Ralph Christofferson 218/935-2211	Box 319 Mahnomen, MN 56557	880	320 36.4%	2 Elementary 1 Secondary	Mahnomen
Minneapolis	Richard Green 612/348-6084	807 N.E. Broadway Minneapolis 55413	41,204	2,376 5.8%	54 Elem.; 1 Middle; 8 Jr.; 3 Sec.; 8 Sr.	Hennepin
Morton	Dale Hanke 507/697-6155	Box 68 Morton, MN 56270	283	40 14.1%	1 Elementary 1 Secondary	Renville
Red Wing	Daniel Mjolsness 612/388-7181	525 East Avenue Red Wing, MN 55066	3,016 3,016	24 1.0%	6 Elementary 1 Jr.; 1 Sr.	Goodhue
St. Paul	George Young 612/293-7621	360 Colborne St. St. Paul, MN 55102	31,675	394 1.2%	37 Elem.; 8 Jr.; 1 Sec.; 6 Sr.	Ramsey
Sandstone	J. Gary Hayden 612/245-2289	Sandstone, Minnesota 55072	719	29 4.0%	1 Elementary 1 Secondary	Washington
Stillwater	Robert Miller 612/439-5160	1875 S. Greeley St. Stillwater 55082	8,052	56 0.7%	9 Elementary; 2 Jr.; 1 Sr.	Pine
(Non-public) Nay-ah-Shing	Don Wedll 612/532-4172	Star[illegible]ute Ona[illegible] MN 56359	47	47 100%	1 Secondary	Mille Lacs Reservation

40788

FIGURE 5
INDIAN AND NON-INDIAN POPULATIONS
OF COUNTIES/MUNICIPALITIES CONTACTED

Counties . Municipalities	Total 1980 Population	1980 Indian Population	
ANOKA COUNTY	195,998	1,112	(00.6%)
BELTRAMI COUNTY	30,982	3,917	(12.6%)
. Bemidji	10,949	462	(04.2%)
CLEARWATER COUNTY	8,761	627	(07.2%)
. Bagley	1,321	85	(06.4%0
COOK COUNTY	4,092	278	(06.8%)
. Grand Marais	1,289	29	(02.2%0
. Grand Portage	324	194	(59.9%)
GOODHUE COUNTY	38,749	185	(00.5%)
. Red Wing	13,736	132	(01.0%0
HENNEPIN COUNTY	941,441	10,478	(01.1%)
. Minneapolis	370,951	8,932	(02.4%)
MAHNOMEN COUNTY	5,535	1,003	(18.1%)
. Mahnomen	1,283	111	(08.7%)
PINE COUNTY	19,871	273	(01.4%)
. Sandstone	1,594	44	(02.8%)
MILLE LACS COUNTY	18,430	495	(02.7%)
RAMSEY COUNTY	459,784	2,993	(00.7%)
. St. Paul	270,230	2,538	(00.9%)
RENVILLE COUNTY	20,401	52	(00.3%)
. Morton	549	17	(03.1%)
ST. LOUIS COUNTY	222,229	2,815	(01.7%)
. Duluth	92,811	1,344	(01.4%)
WASHINGTON COUNTY	113,571	371	(00.3%)
. Stillwater	12,290	23	(00.2%)

FIGURE 6
SUMMARY POPULATION DATA
FOR COUNTIES AND DISTRICTS CONTACTED

	Total Population	Indian Population
PUBLIC SCHOOL ENROLLMENT		
. State of Minnesota	733,983	10,972
. Districts Contacted	138,203	5,189
. Districts Contacted as % of Total State	18.8%	47.3%
POPULATION PER 1980 CENSUS		
. State of Minnesota	4,077,148	35,026
. Counties Contacted	2,079,814	24,599
. Counties contacted as % of Total State	51.0%	70.2%

or Red Wing. The locations of the 11 districts, relative to the state's Indian reservations and metropolitan areas is presented in Figure 8.

Upon receipt of the postcards indicating positive responses, follow-up telephone calls were made to schedule visits to each school district. Visits took place beginning in January, 1982. During each visit, the staff discussed the need for this project and the scope of the activities which were planned. Each superintendent was given a project abstract and a copy of the proposal which had been submitted to WEEA. A part of the discussion during each visit also focused on the particular school district. Superintendents shared with the staff informatin about the grade organization and curriculum design within their schools, their perceptions of the Indian community served by their schools, and information about some of the short and long-range plans for their districts. In each case, before the visit ended, a verbal commitment to cooperate was made by the superintendent or his designee.

A letter of appreciation and confirmation of the commitment received was mailed to each superintendent within a few days of each visit. Careful follow-up was made to those districts which did not submit data within the timeline they had suggested to the staff.

The amount of interaction with the districts after the initial contact and visit varied. In some cases the districts submitted the data they had compiled, and letters of acknowledgement were sent by the project staff. In other cases project staff returned to the school district and provided assistance in compilation of the data. Only one district, Duluth, which had made a commitment to submit data in cooperation with this project failed to do so. Several attempts at follow-up with Duluth went unanswered, so the effort to include local data from that district was abandoned.

FIGURE 7

INITIAL CONTACT LETTER

SPECIAL SCHOOL DISTRICT NO. 1

MINNEAPOLIS PUBLIC SCHOOLS

AN EQUAL OPPORTUNITY SCHOOL DISTRICT

807 NORTHEAST BROADWAY, MINNEAPOLIS, MINNESOTA 55413

January 5, 1982

Dear Superintendent:

The Indian Education Section of the Minneapolis Public Schools has long been interested in the underrepresentation of Indian people in many professions, especially those requiring advanced skills in mathematics and science. For some time we have wanted to be able to take a systematic look at this issue in order to see what we, and others in public school systems, might do to begin to reverse the trend. We have recently been notified by the U.S. Department of Education that we have received a grant under the Women's Educational Equity Act (WEEA) to examine one aspect of this problem.

The proposal which has been funded is a small, one-year grant which will allow us to meet with educators and Indian people in about ten school districts in Minnesota in order to discuss this issue. It is our hope that through these discussions we can begin to document the extent to which Indian girls are presently enrolling in various methematics courses at the secondary level, the kinds of programs which have been attempted or are presently under way to encourage Indian girls to enroll in these courses, and the present thoughts of both educators and parents about the needs for applied research and/or programs in the area.

Those of us involved in this project—Rosemary Christensen, the Director of Indian Education, Chuck Robertson, Jr., and myself--would very much like to include your district in our work. We realize that we probably have not been able to present enough information in this letter to ask you for any kind of commitment to participate. We do, however, hope that this letter has caught your interest and that you will agree to allow us to set up an appointment to meet with you and/or your representative to discuss the project in greater detail. I can, however, assure you that we do not forsee this project to include any testing or surveying of students or any appreciable time commitment on the part of your staff.

For your convenience, I am enclosing a postcard for you to indicate your initial reaction. Upon receipt of a favorable response from you, I will be back in touch, by telephone, to set up a time when we can come to visit with you. As added incentive, if you return the postcard with a positive response, we will provide you with a beautiful poster, suitable for framing, created by Steven Premo, a well-known Minneapolis Indian artist. If there are questions you have at this time, please feel free to call me at (612) 348-6258. I will look forward to your response.

Sincerely,

Jan Witthuhn

Jan Witthuhn,
Administrative Analyst

JW:br
4051B

Enc. - Response Postcard
cc: Dr. Richard Green

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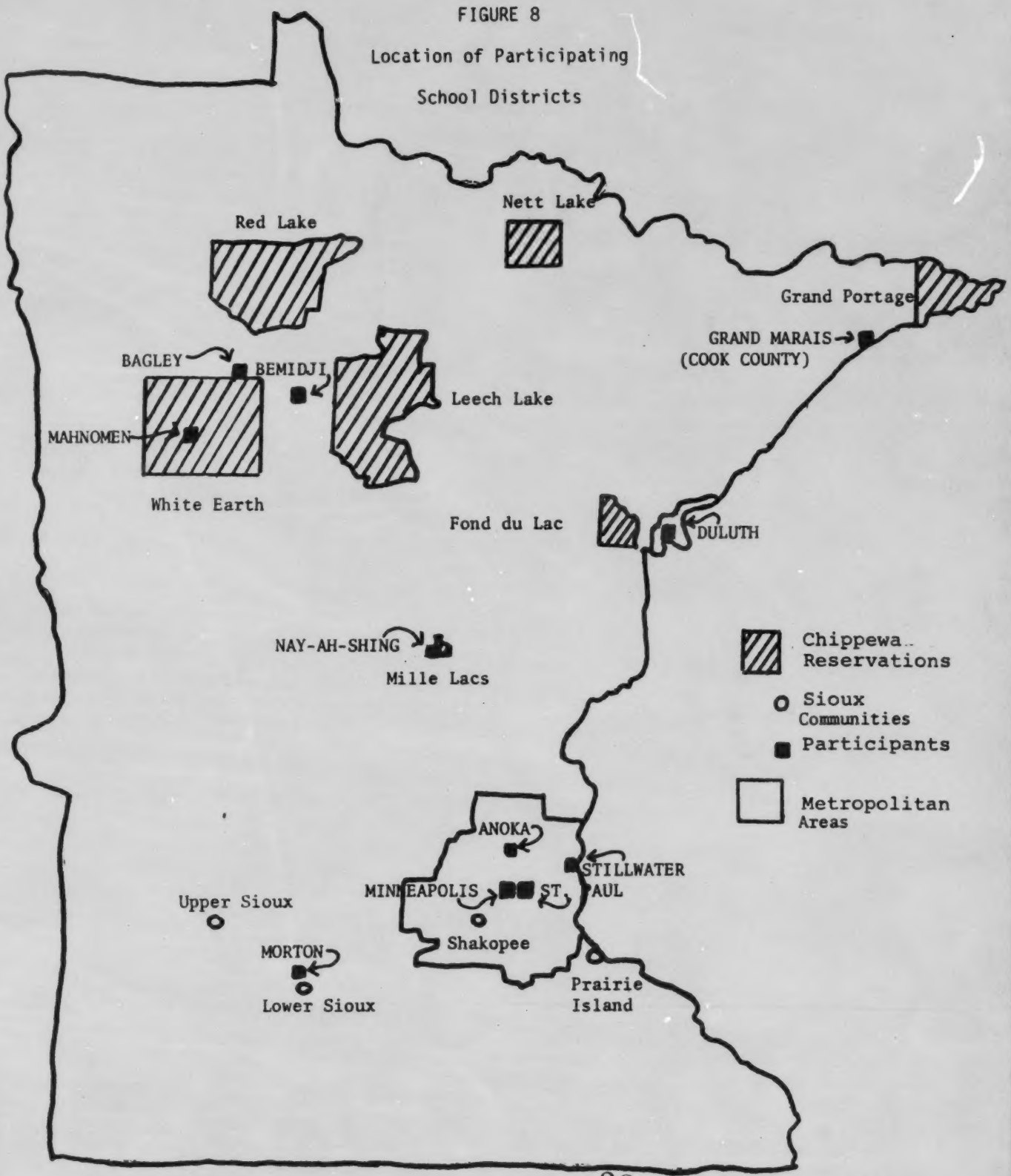
FIGURE 8

Location of Participating

School Districts



4.03 Literature Review and Bibliography

At the same time as the activities described in Sections 4.01 and 4.02 were being implemented, the staff undertook a review of the literature. Studies related to Indians and mathematics as well as to women and mathematics were reviewed. Although it was not part of the originally proposed activities, the staff decided to compile these reviews into an annotated bibliography. The bibliography was printed and distributed to each participating district.

4.04 Indian Women in Mathematics Poster

As the staff began to discuss the project with other members of the Minneapolis Indian community, the staff began to identify a number of Indian women who are employed in the Twin Cities area in jobs for which strong beckgrounds in mathematics and science are necessary. Although it was not an originally proposed activity, the staff decided to design a poster highlighting these Indian women. These posters will be distributed to schools and organizations in the Twin Cities. It is hoped that these posters will encourage Indian girls to broaden their own career aspirations and provide them with incentive to voluntarily enroll in college prep math courses.

4.05 Besides contacting school districts, the project staff also met with a variety of people representing projects directed toward Indian students or women. In every case there was an enthusiastic exchange of information, ideas, and resources. The network building which was begun will be useful to both the Indian Education Section staff and to staff members of other projects in future years.

As a result of the staff's initial contacts with cooperating school districts, an interim report was prepared and shared with others at several national meetings. Educational leaders of each of the tribes in

Minnesota were also contacted and provided with information about the project. When indications of interest were received, follow-up visits were made for further discussions. Figure 9 is a listing of the people with whom the project staff has had contact for purposes of sharing information.

FIGURE 9

INDIVIDUALS AND GROUPS
WITH WHOM INFORMATION WAS SHARED

A. Resource Persons

- Flo Wiger, Director, American Indian Learning Resource Center, University of Minnesota
- Marcie Ardito, Counselor, AILRC, University of Minnesota
- Norine Smith, Director, Minneapolis Indian Health Board
- Deb Allery, Administrative Assistant, Minneapolis IHB
- Bob Dodor, Minnesota Indian Affairs Board
- Ross Taylor, Minneapolis Public Schools Consultant/Mathematics
- Elmer Koch, Minneapolis Public Schools Curriculum Generalist
- Will Antell, Assistant Commissioner, Minnesota State Department of Education
- Carol Bryant, Project Director, Spring Lake Pakr Public Schools
- Don Birmingham, Director, Math Bridge Program, University of Minnesota
- Barbara Plake, Associate Professor of Education Psychology, University of Nebraska-Lincoln

B. Poster Participants and Individuals Who Assisted in Poster Identification Process

- Renee Jones, Dental Student
- Kimberly Jones, Nursing Student
- Dawn Richardson, Engineering
- John Hunter, Computer Programmer
- Kathy Annette, Medical
- Joletta Birdbear, Business
- Celeste Madrid, Medical
- Jackie Boyle, Law
- Lisa Wynde, Business
- Phyllis Johnson, Accountant
- Charmaine Des Jarliat, Nurse
- Jeannine Miller, High School Student
- Madge Belgarde, Accountant
- Dr. Lois Steele, M.D.

C. Tribal Education Leaders

- E. Joy Peacock, Leech Lake Education Director
- Cy Kauchyck, Bois Fort Education Director
- Don Wiesen, Fond du Lac Education Director
- Dick Tanner, MN Chippewa Tribe Education Director
- Verna Wood, Red Lake Education Director
- Jerry Rawley, White Earth Education Director

D. Minneapolis Indian Parents

- Marlene Huf
- Jeanette Loud
- Minnie Oakgrove
- Elizabeth Saice
- Phyllis Taylor
- Sylvia Spence

E. Meetings In-State

- Red Lake Reservation:
  -- Verna Wood; Judy Roy; Delores Cloud
- Minnesota Chippewa Tribe:
  -- Dick Tanner; Harvey Roy
- Leech Lake Reservation:
  -- E. Joy Peacock; Roger Aitken
- University of Duluth:
  -- Larry Aitken, Director Indian Studies
- Pine Point Experimental School
  -- Julie Bolton, Administrator
- Minnesota Council of Teachers of Mathematics
  -- October 22, 1982 Annual Meeting
- Minnesota Reading Association
  -- November 5-6, 1982 Annual Meeting, Math Anxiety and Reading Skills

F. National Conferences

- Women's Educational Equity Act program, National Conference; Washington, D.C.; November 12-13, 1981

  Attended by:
  .WEEA project directors across the country
  .Minneapolis project represented by Rosemary Christensen and Jan Witthuhn

- National Council of Teachers of Mathematics, Equity in Mathematics Core Conference; Reston, Va.; February 19-21, 1982.

  Attended by:
  .28 Advisory Council members, presenters, participants, and observers
  .Minneapolis project represented by Rosemary Christensen

- Arizona State University Indian Education Research Seminar; Tempe, Az.; June 22-25, 1982

  Attended by:
  .Rebecca Robbins, Director, Indian Graduate Program
  .Joel Longie, Doctoral Candidate, Penn State University
  .Ken York, Choctaw Tribal Education
  .Dr. Marigold Linton, Professor, University of Utah
  .Dr. John Red Horse, Professor, School of Social Dev., ASU
  .Graduate Students
  .Minneapolis project represented by Don Allery

- OHOYO Regional Education Equity Awareness Conference; Seattle, Wa.; June 23-26, 1982

  Attended by:
  .Approximately 300 women from 20 states and the District of Columbia. Participants identify with 101 different tribes, bands, and Alaskan Native Corporations
  .Minneapolis project represented by Rosemary Christensen and Jan Witthuhn

- National Indian Education Association Annual Conference; New Orleans, La.; November 20-23, 1982

  Attended by:
  .Approximately 5,000 Indian educators, tribal leaders, and governmental officials
  .Minneapolis project represented by Don Allery

G. Dissemination of Materials

- Participating School Districts
- All Persons Serving as Resources to Project
- OHOYO Resource Center
- BIA Schools, Nationwide
- Interested delegates at National NIEA Convention

5.0 Data from Cooperating School Districts

As a result of the visits by the project staff, the following districts agreed to furnish information for use in this study. A goal of the project was to establish new networks of cooperation and heighten awareness about Indian girls in mathematics courses. For this reason, the project staff agreed to accept data in whatever form it was available rather than insisting that districts undertake a special effort to recollect or reanalyze data for the sake of comparability. The staff recognized the disadvantage of having noncomparable data, but was willing to work with this limitation. One type of comparable data became available through the State Department of Education's Minnesota Civil Rights Information System (MINCRIS). Beginning in fall 1981, Minnesota school districts reported through that system the numbers of students, by ethnic groups, who were enrolled in the highest level of mathematics course offered at each building. That data, combined with data about enrollment, is presented for each cooperating public school district.

5.01 Anoka-Hennepin

Anoka-Hennepin is the second largest school district in Minnesota. It serves the northern suburbs of the Twin Cities metropolitan area. The district's fall 1981 enrollment was 30,854. About 1.1% of the enrollment is American Indian. Anoka's superintendent, Dr. Lewis Finch, designated Mr. Jerry Staples, Title IV Director, as the contact person for this project. Mr. Staples was able to provide information from the Total Informational Education Systems (TIES) computer consortium to which Anoka-Hennepin belongs. The information was provided during August 1982 and was for the 1981-82 school year.

According to the district's data, they enrolled a total of 377 American Indian students. This was up from the 348 reported to the State Department of Education in October. Of the 377, 151 were enrolled in elementary schools and the remaining 226 were enrolled in secondary schools. The breakdown of males and females by grade level was as follows:

Numbers of Indian Students

Grade	Boys	Girls
7	19	15
8	30	17
9	20	15
10	19	12
11	20	15
12	22	20
Total*	130	94

*The additional two students were special education students, not classified by grade.

The following charts summarize the data the district provided regarding the enrollment of its Indian students in mathematics courses.

Math Courses Taken by
Junior High Indian Students

Course Title	Grade 7		Grade 8		Grade 9	
	M	F	M	F	M	F
Math 7	10	14	0	0	0	0
Basic Math 8	0	0	2	1	0	0
Math 8	0	0	24	14	0	0
Advanced Math 8	0	0	3	0	0	0
Basic Math 9	0	0	0	0	5	1
Advanced Math 9	0	0	0	0	2	0
Pre Algebra	0	0	0	0	6	8
Algebra I	0	0	0	0	7	5
Focus Math 7-9	2	0	1	0	1	1

Math Courses Taken by
Senior High Indian Students

Course Title	Grade 10		Grade 11		Grade 12	
	M	F	M	F	M	F
*Business Math	0	0	6	4	1	3
*Consumer Math	0	0	2	1	2	5
*Industrial Math	1	1	2	0	0	0
Basic Geometry	1	1	1	0	0	0
Geometry	2	1	2	1	0	0
Fundamental Math	1	0	2	0	0	1
Elementary Algebra	5	0	0	1	0	0
Higher Algebra	0	1	1	2	0	1
Advanced Math	0	0	0	0	2	1
Elementary Functions	0	2	2	1	2	0

*Semester Courses

In addition to the data provided by the Anoka-Hennepin school district in response to our contacts, the following chart summarizes the data reported by that district to the State Department of Education and reported in the MINCRIS reports. For purposes of the MINCRIS report, districts are asked to report the numbers of students, by race and by sex, who are enrolled in the most advanced math course at each of their buildings. In many districts, the math course which is most advanced will vary from building to building. The number reported is the number enrolled as of the date of the report and is not a cumulative number for the entire school year.

SCHOOL DISTRICT: Anoka

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
30,854	15,806	(51.2%)	15,048	(48.8%)	348	175	(50.3%)	173	(49.7%)	01.1%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
1,580	806	(51.0%)	774	(49.0%)	14	9	(64.3%)	5	(35.7%)	00.9%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 30,854 Indian District Enrollment: 348

Total Advanced Math Enrollment: 1,580 Indian Advanced Math Enrollment: 14

Percent Enrolled in Advanced Math: 05.1% Percent Enrolled in Advanced Math: 04.0%

5.02 Bagley

Bagley is a small, rural community located in Clearwater County, just north of the White Earth Indian Reservation. The district enrolls a total of 1,371 students of which 17.3% are American Indians. Superintendent of Schools Albert Toriseva designated Dr. J. Ronald Henning, the senior high school principal, as contact person for this project. Dr. Henning arranged for project staff to meet with several people on his staff during the visit to Bagley. Among those included were the Indian Home/School Coordinator, teachers, and a guidance counselor.

Besides agreeing to participate in this project by providing data about enrollment in math classes, the Bagley staff decided to also compile comparable data for their science courses. This was done because of their own interest in improving enrollment in both fields. The Bagley staff explained that they were in the process of implementing a series of new courses in math and science which were designed for students with poor reading skills and vocabulary deficiencies which, they suspect, make success in the usual courses unlikely. They hope that by providing these alternative courses, at least at the beginning of the college prep series in math and science, they can increase enrollment, overcome skill deficiencies, and show students that they can be successful in advanced math and science subjects.

The data provided by the Bagley staff indicated an Indian student enrollment of 36 in the senior high grades of 10, 11 and 12. The breakdown of males and females among Indians and non-Indians was:

Senior High Enrollment

Grades	Males		Females	
	Indian	Non-Indian	Indian	Non-Indian
10	7	49	5	42
11	5	50	2	51
12	12	46	5	50
Total	24	145	12	143

The following charts summarize the data the district provided regarding the enrollment of its Indian students in mathematics and science courses.

Math Course Enrollment

Course Title	Males		Females	
	Indian	Non-Indian	Indian	Non-Indian
General Math	3	8	3	2
Business Math	8	25	7	17
Consumer Math	1	18	1	22
Computer Math I	0	3	1	8
Computer Math II	0	4	1	1
Geometry	1	27	0	23
Trig/Adv. Math	0	8	1	3
Algebra II	2	25	1	14

Science Course Enrollment

Course Title	Males		Females	
	Indian	Non-Indian	Indian	Non-Indian
Biology I	3	29	2	33
Chemistry	2	23	0	19
Physics	1	7	0	4
Electronics	2	11	0	2
Indep. St., Electronics	0	4	0	0

In addition to the above data which was provided by the Bagley school district, the following chart summarizes the state's MINCRIS data about enrollment in the most advanced math course.

SCHOOL DISTRICT: Bagley

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	762	(55.6%)	609	(44.4%)		131	(55.3%)	106	(44.7%)	
1,371					237					17.3%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	17	(56.7%)	13	(43.3%)		1	(100.0%)	0	(0.0%)	
30					1					3.3%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 1,371

Total Advanced Math Enrollment: 30

Percent Enrolled in Advanced Math: 02.2%

Indian District Enrollment: 237

Indian Advanced Math Enrollment: 1

Percent Enrolled in Advanced Math: 0.04%

5.03 Bemidji

Bemidji is a small city located in Beltrami County. Bemidji's location, approximately equidistant from the White Earth, Leech Lake and Red Lake Reservations, makes it an important center for services to Indian people in northern Minnesota. The University of Minnesota maintains a four-year campus in Bemidji. The Bemidji Public Schools enrolled a total of 4,495 students in the fall of 1981. Of that total, 7.3% were American Indian.

Assistant Superintendent of Schools, Dr. Philip A. Bain, was designated to meet with project staff. The data Dr. Bain provided was collected for him by Mr. Jim Jerome, Bemidji's Indian Education Director. The following chart indicates the numbers of Indian students enrolled at the senior high level in Bemidji.

Numbers of Indian Students

Grade	Boys	Girls
9	15	9
10	10	8
11	8	7
12	7	3
Total	40	27

The following chart summarizes the data the Bemidji district provided regarding the enrollment of its Indian students in senior high mathematics courses.

Indian Student Enrollment in Mathematics Courses

Course Title	Males	Females
Geometry I	0	0
Geomtery II	1	2
Inter. Algebra I	0	0
Inter. Algebra II	1	1
Inter. Algebra III	0	0
Trigonometry	0	0
Prob. and Statistics	1	0
Pre-Calculus I	0	0
Pre-Calculus II	0	0
Computer Math I	0	0
Computer Math II	0	0
Computer Math III	0	0
Computer Math IV	0	0
Basic Algebra I	0	0
Basic Algebra II	2	0
Applied Math	0	0
Computer Assisted Math	0	0
Algebra I	0	0
Algebra II	4	5
Practical Geometry	4	2
Inter. Math I	0	0
Inter. Math II	1	2
General Math I	5	0
General Math II	2	0

Following is a chart reporting the data about enrollment in the most advanced math course, taken from the State Department of Education's MINCRIS report.

SCHOOL DISTRICT: Bemidji

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	2,335	(51.9%)	2,160	(48.1%)		183	(56.0%)	144	(44.0%)	
4,495					327					07.3%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	135	(47.2%)	151	(52.8%)		1	(50.0%)	1	(50.0%)	
286					2					00.7%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 4,495

Indian District Enrollment: 327

Total Advanced Math Enrollment: 286

Indian Advanced Math Enrollment: 2

Percent Enrolled in Advanced Math: 06.4%

Percent Enrolled in Advanced Math: 00.6%

5.04 Cook County

This school district, as its name suggests, encompasses an entire county. Cook County is a very remote and sparsely populated area located on the north shore of Lake Superior at the very point of Minnesota's Arrowhead Region, formed by Lake Superior to the southeast and Canada to the north. The Grand Portage Indian Reservation is located within Cook County, and one of the district's three elementary schools is located on the reservation. Cook County maintains some of the longest bus routes in the state in order to transport its secondary students up to 75 miles each way to attend secondary school. The district's total enrollment was 749 students, of which 7.1% were American Indian.

Dr. Warren J. Rolek, the Superintendent of Schools, met with project staff and submitted the following data which was compiled for him by the high school principal and counselor.

Grade Level Enrollment in Mathematics Course

Course Title	Grade Level			
	9	10	11	12
*Algebra 9	48	0	0	0
Basic 9	17	0	0	0
*Math 10	6	30	0	0
*Math 11	2	2	9	1
Algebra Review	0	1	1	4
Open Math	1	3	4	1
Personal Math	0	2	15	2
Computer Math	0	0	5	13
*Math 12	0	0	0	10

*College program

Enrollment in Mathematics Courses, By Gender

Course Title	Total Enrollment Male	Total Enrollment Female	Indian Enrollment Male	Indian Enrollment Female
*Algebra 9	23	25	0	1
Basic 9	9	8	0	2
*Math 10	18	18	0	0
*Math 11	5	9	0	0
Algebra Review	5	1	0	0
Open Math	7	2	0	0
Personal Math	12	7	0	2
Computer Math	9	9	1	2
*Math 12	5	5	0	0

*College program

Grades Earned By Indian Students

Course Title	# of Indian Students	Grades Earned
*Algebra 9	1	B-
Basic 9	2	C-, C-
Personal Math	2	B-, F
Computer Math	3	B, B, B+

The following chart summarizes MINCRIS data about Cook County advanced math enrollment.

SCHOOL DISTRICT: Cook County

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	388	(51.8%)	361	(48.2%)		27	(50.9%)	26	(49.1%)	
749					53					7.1%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	15	(51.7%)	14	(48.3%)		0	(0.0%)	0	(0.0%)	
29					0					0.0%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 749

Indian District Enrollment: 53

Total Advanced Math Enrollment: 29

Indian Advanced Math Enrollment: 0

Percent Enrolled in Advanced Math: 3.9%

Percent Enrolled in Advanced Math: 0.0%

5.05 Duluth

Duluth is the only metropolitan center in nothern Minnesota. Duluth is located in St. Louis County along the Lake Superior shoreline where Minnesota boarders on Wisconsin. Duluth is the home of a major campus of the University of Minnesota which has several special programs for American Indian students. Duluth is located only a few miles east of the Fond du Lac Indian Reservation.

The Duluth Public Schools enrolled a total of 15,364 students in fall, 1981. Of that number, 2.6% were Indian. Assistant Superintendent Eugene Lynch was designated to meet with the project staff. Although there was a verbal agreement to provide data to this project during the initial visit, the data was never received. Several follow-up letters went unanswered. Thus the only data included in this report is the MINCRIS data about enrollment in the most advanced math course at each high school.

SCHOOL DISTRICT: Duluth

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	7,831	(51.0%)	7,533	(49.0%)		201	(51.0%)	193	(49.0%)	
15,364					394					02.6

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	687	(52.6%)	619	(47.4%)		3	(75.0%)	1	(25.0%)	
1,306					4					0.3%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 15,364 Indian District Enrollment: 394

Total Advanced Math Enrollment: 1,306 Indian Advanced Math Enrollment: 4

Percent Enrolled in Advanced Math: 08.5% Percent Enrolled in Advanced Math: 01.0%

5.06 Mahnomen

Mahnomen is a small town located within the boundaries of the White Earth Indian Reservation. Of the public schools included in this study, Mahnomen has the highest concentration of Indian students. Of the 880 students enrolled in this district, 36.4% were American Indians.

Dr. Ralph Christofferson, Superintendent, designated Mr. Verne Wick, high school counselor, to meet with the staff of the project. Mr. Wick was joined by Lois Olson, the Home/School Coordinator, during that meeting. Both Mr. Wick and Ms. Olson conveyed their concern that there was a general lack of interest in college preparatory courses in math and science among all of their students, Indian and non-Indian. Because of the low interest, many courses normally considered to be part of a comprehensive high school program can be offered only once every two or three years in Mahnomen. Mr. Wick provided the following data about the numbers of senior high students and their enrollment in college-bound math courses.

Senior High Enrollment

Grade	# Indian	# Non-Indian
10	21	57
11	20	61
12	14	59
Total	55	177

Enrollment in Math Courses

Course Title	# Indian	# Non-Indian
Geometry	9	44
Intermediate Algebra	4	19
Math Analysis	2	6

In addition to the data provided by the district, the following data comes from the state's MINCRIS report.

SCHOOL DISTRICT: Mahnomen

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	458	(52.0%)	422	(48.0%)		170	(53.1%)	150	(46.9%)	
880					320					36.4%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	15	(48.4%)	16	(51.6%)		3	(60.0%)	2	(40.0%)	
31					5					16.1%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 880

Total Advanced Math Enrollment: 31

Percent Enrolled in Advanced Math: 3.5%

Indian District Enrollment: 320

Indian Advanced Math Enrollment: 5

Percent Enrolled in Advanced Math: 1.6%

5.07 Minneapolis

Minneapolis is the largest city in Minnesota. The school district boundaries are coterminous with those of the city itself. The Minneapolis Public Schools enrolled 41,204 students in the fall of 1981, making it the largest school district in the state. Of its total enrollment, 5.8% of the students were American Indian.

Since the staff of this project are Minneapolis Public Schools' employees and, since the district as a whole as well as its Indian Education Section have access to a more complete record keeping system, a wider variety of data was available from Minneapolis than from any other district included in this study.

Secondary Student Enrollment

Grade	# Indian	# Non-Indian
7	182	2809
8	191	2647
9	191	2851
10	189	3045
11	117	3238
12	94	2941
Total	964	17,531

PARTICIPATION IN MATHEMATICS COURSES, BY GENDER AND BY RACIAL/ETHNIC GROUP

	1976	1981
Proportion of Females Enrolled in Minneapolis Public Schools' Math Courses		
. Geometry	50%	50%
. Algebra II	47%	47%
. Math Analysis	35%	43%
. Calculus	25%	43%
Racial/Ethnic Composition of Minneapolis Public Schools' Math Courses		
. Geometry		
- American Indian	1%	1%
- Black	7%	10%
- Asian	2%	3%
- Hispanic	1%	1%
- White	89%	85%
. Algebra II		
- American Indian	1/2%	1%
- Black	3%	9%
- Asian	2%	6%
- Hispanic	1/2%	1/2%
- White	94%	83%
. Math Analysis		
- American Indian	1%	1/2%
- Black	2%	4%
- Asian	3%	6%
- Hispanic	1%	1/2%
- White	94%	89%
. Calculus		
- American Indian	0%	1%
- Black	0%	4%
- Asian	11%	12%
- Hispanic	0%	1%
- White	89%	82%
. Total Secondary Enrollment		
- American Indian	4%	5%
- Black	12%	18%
- Asian	1%	4%
- Hispanic	1%	1%
- White	83%	72%

These data are adapted from "Equity in Mathematics: A Case Study," a paper by Ross Taylor, Mathematics Consultant, Minneapolis Public Schools

ENROLLMENT AND PERFORMANCE OF INDIAN STUDENTS IN COLLEGE PREP MATH COURSES, 1980-81

Course Title		Grade A	B	C	D	I	F	Total
Pre-Algebra								
	Males	0	0	0	0	0	1	1
	Females	0	0	0	0	0	0	0
Pre-Alg. Comput								
	Males	1	3	3	3	0	0	10
	Females	2	2	1	1	0	2	8
Elem. Algebra (full year)	Males	0	1	8	1	0	3	13
	Females	0	4	2	0	0	1	7
Elem. Alg. 1								
	Males	0	0	4	2	0	3	9
	Females	1	2	5	3	0	0	11
Elem. Alg. 2								
	Males	0	1	1	5	0	2	9
	Females	1	3	3	1	0	3	11
Elem. Alg. 3								
	Males	0	1	1	2	0	5	9
	Females	1	3	3	2	0	2	11
Geometry (full year)	Males	1	2	1	0	1	2	5
	Females	3	0	0	1	1	1	6
Geometry 1								
	Males	0	2	4	2	0	0	8
	Females	0	0	3	1	0	2	6
Geometry 2								
	Males	0	2	3	1	0	1	7
	Females	0	0	1	3	0	0	4
Geometry 3								
	Males	0	3	0	1	0	1	5
	Females	0	1	0	0	0	2	3
Adv. Alg. 1								
	Males	0	1	2	0	1	1	4
	Females	0	1	1	0	0	2	4
Adv. Alg. 2								
	Males	0	1	0	3	0	0	4
	Females	0	1	0	1	0	0	2

Course Title		Grade A	B	C	D	I	F	Total
Adv. Alg. 3	Males	0	1	1	2	0	0	4
	Females	0	0	1	0	0	0	1
Algebra Trig (full year)	Males	4	1	0	0	0	0	5
	Females	0	0	0	0	0	0	0
Algebra Trig 1	Males	0	0	1	0	0	0	1
	Females	0	0	0	1	1	0	2
Algebra Trig 2	Males	0	1	0	0	0	0	1
	Females	0	0	0	0	0	1	1
Algebra Trig 3	Males	0	0	1	0	0	0	1
	Females	0	0	1	0	0	0	1
Trigonometry	Males	0	1	0	0	0	0	1
	Females	0	0	1	0	0	0	1
Higher Alg. 1	Males	0	0	1	0	0	0	1
	Females	0	1	0	0	0	0	1
Higher Alg. 2	Males	0	1	0	0	0	0	1
	Females	0	1	0	0	0	0	1
Higher Alg. 3	Males	0	0	0	1	0	0	1
	Females	0	0	1	0	0	0	1
Math Analy. 1	Males	0	0	1	0	0	0	1
	Females	0	0	1	0	0	0	1
Math Analy. 2	Males	0	0	0	1	0	0	1
	Females	0	0	1	0	0	0	1
Math Analy. 3	Males	0	0	0	0	0	0	0
	Females	0	0	1	0	0	0	1
Adv. Pl. Calcu 1	Males	1	0	0	0	0	0	1
	Females	0	0	0	0	0	0	0

Course Title		Grade A	B	C	D	I	F	Total
Adv. Pl. Calcu 2								
	Males	0	1	0	0	0	0	1
	Females	0	0	0	0	0	0	0
Adv. Pl. Calcu 3								
	Males	0	1	0	0	0	0	1
	Females	0	0	0	0	0	0	0

GRADE 3 SCORES

MEDIAN ACHIEVEMENT ON SRA AND CALIFORNIA MATHEMATICS TESTS

	SRA MATHEMATICS TEST Computation and Concepts				CALIFORNIA MATHEMATICS TEST Computation		Concepts/Applic.	
	Grade Equiv.		Natl. %ile Ranks		Gr.Eq.	Nat.%ile	Gr. Eq.	Nat.%ile
Grade 3 Students	Spring Testing 1980	1981	Spring Testing 1980	1981	Spring Testing 1982	1982	Spring Testing 1982	1982
Indian	3.8	3.9	47	54	3.7	48	3.5	45
Black	3.8	3.8	45	47	3.7	51	3.4	42
Asian	4.6	4.7	77	82	4.5	78	4.4	68
Hispanic	3.7	4.1	42	60	4.1	67	3.9	57
White	4.6	4.7	79	80	4.3	73	4.6	72
Males	4.4	4.4	72	70	4.0	67	4.2	64
Females	4.5	4.5	73	73	4.0	67	4.2	63
ALL STUDENTS	4.4	4.4	72	72	4.0	67	4.2	64

GRADE 6 SCORES

MEDIAN ACHIEVEMENT ON SRA AND CALIFORNIA MATHEMATICS TESTS

Grade 6 Students	SRA MATHEMATICS TEST Computation Gr. Eq. Spring Testing 1980	1981	Nat.%ile Testing 1980	1981	Concepts Gr. Eq. Spring Testing 1980	1981	Nat.%ile Testing 1980	1981	CALIF. MATHEMATICS TEST Computation G.E. Spring 1982	N.% 1982	Conc./Appl. G.E. Spring 1982	N.% 1982
Indian	6.0	5.9	35	34	6.3	6.3	39	40	6.6	48	6.5	46
Black	5.4	5.7	27	31	6.1	6.2	35	36	6.9	53	6.2	42
Asian	7.1	7.5	55	65	8.5	8.9	73	77	9.0	90	8.0	73
Hispanic	6.1	6.7	36	45	6.6	7.4	44	57	7.6	65	7.3	60
White	7.3	7.4	60	63	7.6	7.9	60	64	8.2	81	8.1	74
Males	7.0	7.1	52	54	7.0	7.1	50	52	7.8	70	8.0	69
Females	7.0	7.2	52	56	7.4	7.5	57	59	8.0	77	7.7	65
ALL STUDENTS	7.0	7.1	52	55	7.1	7.3	53	56	7.9	74	7.9	67

GRADE 8 SCORES

MEDIAN ACHIEVEMENT ON CALIFORNIA MATHEMATICS TESTS

Grade 8 Students	COMPUTATION Grade Equiv. Spring Testing 1980	1981	Natl.%ile Ranks Spring Testing 1980	1981	CONCEPTS AND APPLICATIONS Grade Equiv. Spring Testing 1982	1982	Natl.%ile Ranks Spring Testing 1982	1982
Indian	8.0	8.8	39	51	7.9	8.1	37	43
Black	7.9	8.0	34	40	7.6	7.9	33	36
Asian	12.5	12.5	78	84	10.3	10.2	71	70
Hispanic	10.8	8.0	69	43	10.1	8.8	69	51
White	10.5	10.6	68	68	10.3	10.2	70	69
Males	9.0	9.0	55	55	9.8	9.6	62	61
Females	10.5	10.5	66	66	9.8	9.7	62	61
ALL STUDENTS	9.8	10.0	60	61	9.8	9.6	62	61

GRADE 10 SCORES

MEDIAN ACHIEVEMENT ON STANFORD TEST OF ACADEMIC SKILLS

Grade 10 Students	READING National %ile Ranks Fall Testing 1979	1980	1981	ENGLISH National %ile Ranks Fall Testing 1979	1980	1981	MATHEMATICS Natl. %ile Ranks Fall Testing 1980	1981
Indian	20	30	30	26	24	24	27	30
Black	16	18	23	21	20	26	23	26
Asian	37	37	32	35	33	39	63	66
Hispanic	27	25	35	39	31	37	41	35
White	51	51	56	49	49	49	52	51
Males	45	44	47	38	37	38	46	48
Females	46	45	49	51	49	50	48	46
ALL STUDENTS	46	44	48	44	42	44	46	46

Each year the Minneapolis Public Schools administers its Student Opinion Questionnaire (SOQ) to all students in the seventh grade. The following data was taken from the results of the May 1981 administration of the SOQ.

Statement	Indian N=162	Black N=429	Asian N=31	Hisp N=18	White N=1599	Female N=1122	Male N=11
Liking of School							
I like school	69%	74%	71%	83%	71%	76%	67%
I don't like my classes	33	31	32	17	29	29	30
I don't like doing schoolwork	40	42	36	39	50	42	53
I look forward to going to school	61	66	61	67	49	59	49

How much has your school helped you in each of the following areas?	Response	Indian	Black	Asian	Hisp	White	Female	Male
Improving writing skills	A Lot	29%	34%	19%	33%	22%	27%	22%
	Some	58	50	61	67	56	55	55
	Little or None	14	16	19	0	22	18	23
Improving art skills and knowledge	A Lot	36%	38%	39%	28%	29%	30%	33%
	Some	44	45	36	50	46	47	45
	Little or None	20	18	26	22	24	23	22
Improving music skills and knowledge	A Lot	34%	41%	39%	29%	40%	44%	36%
	Some	36	30	29	24	32	31	32
	Little or None	30	29	32	47	28	25	32
Improving math skills	A Lot	51%	57%	61%	50%	59%	58%	58%
	Some	40	33	26	50	34	34	35
	Little or None	9	9	13	0	7	8	7
Improving reading skills	A Lot	46%	50%	36%	56%	34%	37%	38%
	Some	36	38	48	33	48	44	46
	Little or None	18	12	16	11	19	19	16
Developing good work habits	A Lot	29%	35%	23%	17%	29%	30%	30%
	Some	58	50	58	78	53	54	52
	Little or None	13	15	19	6	18	16	19
Learning to be responsible for	A Lot	44%	53%	37%	44%	39%	44%	40%
	Some	41	35	43	33	46	42	45
	Little or None	15	11	20	22	16	14	15
Improving speaking skills	A Lot	29%	34%	30%	39%	22%	25%	24%
	Some	43	36	27	28	36	36	37
	Little or None	28	30	43	33	42	39	39

The Minneapolis Public Schools maintains an Indian Education Section. Under the leadership of its director, the Section administers a variety of programs designed to provide supplemental services to Indian students and assist the district to better serve Indian students. Each year the section conducts a needs assessment in the Indian community. This information is useful in establishing priorities and planning services. Following are the rank-ordered results of the 1981-82 needs assessment.

RANK-ORDERED RESULTS
OF INDIAN EDUCATION
NEEDS ASSESSMENT

1. Last year about 50% of all Indian students in Minneapolis had very low test scores in reading and arithmetic. There is a need to do something to improve reading and arithmetic skills of Indian children.

2. A 1980 State Planning Agency report estimates that 40% of Minnesota Indians have a serious problem with chemical dependency, as compared with 8.5% of the general population. That report also suggests that chemical dependency affects almost all Indian families in some way. There is a need for Indian adults to work with students who have problems which are related to chemical dependency.

3. National as well as local data indicates that after about the third grade, Indian students fall further and further behind non-Indian students in school with each year that goes by. There is a need for programs to help Indian students keep up with other students their age.

4. Last year 4.4% of the 2197 Indian students who attended the Minneapolis Public Schools dropped out of school. There is a need to do something to try to stop Indian children from dropping out of school.

5. Last year almost 31.0% of the Indian students in Minneapolis had bad attendance records. There is a need to do something to improve the attendance rate of Indian children.

6. Last year's data indicates Minneapolis Indian children were affiliated with 49 different tribes. 79.6% were Chippewa, 8.1% Sioux, 4.7% Other, 3.5% Unknown, 1.3% Winnebago, 1.2% Chippewa- Sioux, 1.0% Cherokee, .5% Menominee. We have no data about how much students know about their culture. There is a need for Indian students to learn about their Minneapolis Native culture.

7. Last year only 5.9% of all Indian students in Minneapolis had high test scores in reading and fewer than 8.4% had high test scores in arithmetic. There is a need to do something for Indian students with lots of ability in reading and arithmetic so they will graduate, go on to college, and become our future leaders.

8. Last year 1.5% of all Indian students in Minneapolis received special education services because they were handicapped or has a learning disability. There is a need for Indian adults to be involved in the delivery of special education services to Indian children.

9. To assure that equal and meaningful education is provided to all students, Minnesota law requires that schools report the language spoken by students and their families at home. Results of the district's Home Language Questionnaire indicate that 6.9% of the Minneapolis Indian students are exposed to a Native language at home. There is a need for Indian students to learn about their Native language.

10. Last year 29% of the Indian seventh graders indicated that they believed their schools were pretty lonely places. This compares with 22% of the black seventh graders and 21% of the white seventh graders. There is a need for Indian people in the schools to befriend Indian children.

11. Last year 54% of the Indian students in twelfth grade saw a school guidance counselor more than three times. This compares with 51% of the white twelfth graders and 82% of black twelfth graders. There is a need for Indian people to counsel and advise Indian students.

12. Last year 62% of the Indian students who graduated from high school indicated that they planned to go on to college, trade, or technical schools. This compares with 68% of the white graduates and 77% of the black graduates. There is a need for Indian people to provide post-secondary and career counseling to Indian students.

13. Last year 47% of the Indian high school seniors talked to a school guidance counselor about a personal concern. This compares with 26% of the white seniors and 42% of the black seniors. There is a need for Indian people in the schools to discuss personal concerns with Indian students.

Besides the above locally-provided data about enrollment, achievement, and attitudes, the following chart represents data from the state's MINCRIS report.

SCHOOL DISTRICT: Minneapolis

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	22,289	(52.1%)	20,508	(47.9%)		1,188	(50.0%)	1,188	(50.0%)	
41,204					2,376					05.8%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	1,051	(55.3%)	850	(44.7%)		46	(61.3%)	29	(38.7%)	
1,901					75					03.9%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 41,204 Indian District Enrollment: 2,376

Total Advanced Math Enrollment: 1,901 Indian Advanced Math Enrollment: 75

Percent Enrolled in Advanced Math: 4.6% Percent Enrolled in Advanced Math: 3.2%

5.08 Morton

Morton is a small town located in the southwestern Minnesota farmland along the Minnesota River. It is the population center closest to the Lower Sioux Community. The Morton Public Schools enrolled a total of 283 students in the fall of 1981. Of the number, 14.1% were American Indians. Of the public school districts included in this study, Morton is the smallest.

Following a visit from the project staff, Superintendent Dale L. Hanke provided the following data about the enrollment of Indian girls in advanced math courses over a three-year period of time.

Senior High Enrollment

	1981-82			1980-81			1979-80		
Grade	10	11	12	10	11	12	10	11	12
Total Enrollment	18	31	23	30	23	22	25	24	29
Boys	8	15	11	15	12	10	13	14	8
. Indian	1	2	0	2	0	1	0	3	0
. Non-Indian	7	13	11	13	12	9	13	11	8
Girls	10	16	12	15	11	12	12	10	21
. Indian	0	2	1	2	0	1	1	0	3
. Non-Indian	10	14	11	13	11	11	12	9	18

Enrollment in Advanced Math

	1981-82			1980-81			1979-80		
Grade	10	11	12	10	11	12	10	11	12
Number of girls in adv. math	3	8	8	2	5	4	3	4	5
Number of Indian girls in adv. math	0	1	1	0	0	0	0	0	2

In addition to the data provided by Superintendent Hanke, the following chart presents data about Morton. This data comes from the MINCRIS reports for 1981-82.

SCHOOL DISTRICT: Morton

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	140	(49.5%)	143	(50.5%)		18	(45.0%)	22	(55.0%)	
283					40					14.1%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	12	(46.2%)	14	(53.8%)		1	(100.0%)	0	(0.0%)	
26					1					03.8%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 283

Indian District Enrollment: 40

Total Advanced Math Enrollment: 26

Indian Advanced Math Enrollment: 1

Percent Enrolled in Advanced Math: 9.2%

Percent Enrolled in Advanced Math: 2.5%

5.09 St. Paul

St. Paul, located across the river from Minneapolis, is the state capital and the second largest city in Minnesota. The St. Paul Public Schools enrolled 31,675 students in the fall of 1981. Of that number, 1.2% were American Indians.

Initial contact by the project staff was with Superintendent of Schools George P. Young. Dr. Young referred the staff to his Deputy Superintendent, Mr. Kenneth Berg. During a visit with Mr. Berg, a commitment to cooperate was received, and Mr. Mark Gilbert-Cougar, St. Paul's Supervisor of Instructional Research and Evaluation, was assigned responsibility to determine what data could be provided. Several meetings between Mr. Gilbert-Cougar and the project staff occurred, including work sessions to access summary data on the achievement test scores of Indian students. Mr. Gilbert-Cougar also provided copies of several existing district reports related to dropouts from the St. Paul Public Schools. The following chart summarizes the dropout data for two years.

Dropout Data

	1980-81			1979-80		
Ethnic Group	Boys	Girls	Total	Boys	Girls	Total
Black	68	64	132	56	66	122
Hispanic	45	29	74	35	22	57
Asian	19	20	39	2	3	5
Native American	15	9	24	3	9	12
Unknown Ethnic	15	14	19	21	22	43
Total Minority	162	136	298	117	122	239
Non-Minority	394	250	644	363	263	626
TOTAL DROPOUTS	566	386	942	480	385	865
DROPOUT PERCENTAGE	-	-	8.9%	-	-	5.3%

According to the information reported, St. Paul is especially hopeful that recently implemented efforts to provide prescriptive programming will better serve potential dropouts and keep more students in school.

The following chart represents the results of the Title IV, Part A, Indian Education Program needs assessment for 1981-82. It reflects the perceived needs of Indian people in St. Paul.

Title IV Needs Assessment,
Rank-Ordered Results

1. I believe that the Indian Education Project should ensure that Indian students have an opportunity to learn to read, to write, and speak effectively.
2. I believe that the Indian Education Project should ensure that Indian students have an opportunity to learn where they may turn to for emergency assistance.
3. I believe that the Indian Education Project should ensure that Indian students who need chemical dependency counseling have it available to them.
4. I believe that the Indian Education Project should ensure that Indian students have opportunities to learn about their heritage.
5. I believe that the Indian Education Project should ensure that Indian students who need assistance for more than one year have it available to them.
6. I believe that the Indian Education Project should ensure that Indian students are aware of the services provided by the Title IV (186a) staff.
7. I believe that the Indian Education Project should ensure that Indian students have opportunities for vocational experiences.
8. I believe that the Indian Education Project should ensure that Indian students have an opportunity to learn about college level programs.
9. I believe that the Indian Education Project should ensure that Indian students have an advocate in school-related problems.
10. I believe that the Indian Education Project should ensure that Indian students have academic remediation available to them.
11. I believe that the Indian Education Project should ensure that Indian students have academic counseling program available to them.
12. I believe that the Indian Education Project should ensure that Indian students who need clothing and other school supplies have an opportunity to get them.

Standardized test results for Indian children were accessed for the 1981-82 school year. The following chart shows the grade level and gender of the Indian students for whom test results were available.

Numbers of Indian Students with Test Results

Grade Level	Males	Females
K	0	0
1	8	6
2	2	2
3	15	15
4	10	24
5	18	23
6	23	24
7	11	26
8	20	21
9	11	17
10	14	8
11	5	12
12	13	5
TOTAL	150	183

The following chart summarizes the mean percentile mathematics score for male and female Indian students at each grade level.

Mean Percentile Math Achievement Test Score

GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6	
44.0	20.0	23.1	29.3	34.4	33.7	Indian Males
33.0	29.5	39.1	33.9	44.4	36.3	Indian Females
39.4	24.8	31.1	32.6	40.0	35.0	All Indian Students

GRADE 7	GRADE 8	GRADE 9	GRADE 10	GRADE 11	GRADE 12	
25.3	37.7	37.5	30.0	44.0	27.8	Indian Males
40.9	35.8	35.5	51.4	51.5	23.2	Indian Females
36.3	36.9	36.3	37.8	49.3	26.6	All Indian Students

Unfortunately, St. Paul was unable to provide data on the enrollment of Indian students in advanced mathematics courses. The following data, however, comes from the 1981-82 MINCRIS report.

SCHOOL DISTRICT: St. Paul

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
31,675	16,536	(52.2%)	15,139	(47.8%)	394	201	(51.0%)	193	(49.0%)	01.2%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
2,762	1,485	(53.8%)	1,277	(46.2%)	7	3	(42.9%)	4	(57.1%)	0.3%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 31,675 Indian District Enrollment: 394

Total Advanced Math Enrollment: 2,762 Indian Advanced Math Enrollment: 7

Percent Enrolled in Advanced Math: 08.7% Percent Enrolled in Advanced Math: 1.8%

5.10 Stillwater

Stillwater is a community separated from St. Paul by only about fifteen miles. It is located in Washington County and is considered to be part of the suburban metropolitan area. The Stillwater Public Schools enrolled 8,052 students in the fall of 1982. Of that number, 0.7% were American Indians. Superintendent of Schools Robert L. Miller designated Mrs. Nancy Hof, Indian Education Coordinator, as the contact person for this project. During a visit with Mrs. Hof, the project staff was able to meet and talk with a number of teachers about the Stillwater Indian student population and about programs designed to address their needs.

Mrs. Hof provided the following data about Indian girls in the secondary grades.

Secondary School Enrollment

Grade	Number of Indian Girls
7	4
8	2
9	3
10	1
11	3
12	3
Total	17

SRA Total Math Score Percentile Rank for Indian Girls in Third Grade

Girl A	58%
Girl B	55%
Girl C	No data
Girl D	No data
Girl E	24%

Math Grades for
Indian Girls in Junior High

	Course	Quarter 1	Quarter 2
Girl A	Math 7	B-	C+
Girl B	Math 7	B+	B+
Girl C	Math 7	A-	A
Girl D	Math 7	B	A-
Girl E	Math 8	B-	C
Girl F	Math 8	C	B
Girl G	Practical Life Math	B-	B
Girl H	Math 9A*	B	C-
Girl I	Algebra I	D+	D+
Girl J	Algebra I	C+	C
Girl K	Geometry	B+	C

*Math 9A is the first part of a two-year Algebra I sequence.

Math Performance for
Indian Girls in Senior High

	Course	Grade	SRA Total Math
Girl A	Algebra 2	C	-
Girl B	Algebra 2	C-	-
Girl C	Applied Math	C-	-
Girl D	Pre-Calculus	B-	99%
Girl E	No math	-	-
Girl F	No math	-	-

In addition to the data provided by Mrs. Hof, the following data was taken from the state's MINCRIS report.

SCHOOL DISTRICT: Stillwater

District Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	4,151	(51.6%)	3,901	(48.4%)		27	(48.2%)	29	(51.8%)	
8,052					56					00.7%

Advanced Math Enrollment

Total	Male #	Male %	Female #	Female %	Indian	Male #	Male %	Female #	Female %	Indians as % of Total
	208	(49.6%)	211	(50.4%)		0	(0.0%)	0	(0.0%)	
419					0					0.0%

Portion of Students Enrolling in Advanced Math Courses

Total District Enrollment: 8,052

Indian District Enrollment: 56

Total Advanced Math Enrollment: 419

Indian Advanced Math Enrollment: 0

Percent Enrolled in Advanced Math: 5.2%

Percent Enrolled in Advanced Math: 0.0%

5.11 Nay-ah-Shing

Nay-ah-Shing is a private, Indian-controlled secondary school on the Mille Lacs Reservation. The school was founded in order to provide an all-Indian alternative to the public schools for Mille Lacs children in grades 7 through 12. Nay-ah-Shing was included in this study because it enrolls an all-Indian student body, it is a secondary school, it is accredited by the North Central Association of Colleges and Schools, and its administrator, Don Wedll, has a strong background in mathematics.

During a visit by the project staff, Mr. Wedll shared some of his hypotheses about things which cause difficulty for Indian students in math courses. Mr. Wedll suggested that several causes relate to the system of linear logic which predominates in mathematics. The linear logic system has caused math instruction to be structured in such a way that each lesson builds on those which have preceeded it. This structure makes it very difficult for students with irregular school attendance patterns to succeed. Attempts to replace the linear structure with some other structure such as a spiral, for example, might be more successful with Indian students.

As a follow-up to the visit and discussion, Mr. Wedll provided the following statement about the enrollment and performance of Indian girls in his area:

> "In checking the number of girls that took upper level math and/or science classes in high school for the last eleven years at Onamia, I found one student who took algebra, higher algebra, and geometry. I found no students who took a science program. Some students took biology but did not complete it, no one took chemistry or physics.
>
> "At Nay ah shing School we have no students who have taken a complete course in algebra, geometry, and trigonometry. Nor, did we have anyone who completed a science program.
>
> "There were approximately 55 Indian high school girls who could have take upper level math and science programs."

6.0 Results of Data Analysis

As has been anticipated, the data provided by the cooperating school districts lacked complete consistency. Some districts provided not only the data requested, but submitted data about Indian boys and non-Indian students as well. Some districts were unable to provide part of the data they originally expected to provide. One of the problems experienced by several of the cooperating districts was determining which students are Indians. At present, many school districts in Minnesota find themselves defining Indian students one way for purposes of reports to the Office of Civil Rights and to the State Department of Education and another way when applying for supplemental funds for programs supported by Title IV of the Indian Education Act. The cooperating school districts were asked to provide data for this project in whatever form made the most sense to them and would most likely be useful to them. The diversity in response format is reflective of the differences among school district perceptions of this subject as a priority problem in their schools.

Although an examination of Indian dropout rates was not an intended project activity, a quick analysis of the data seems to support the fact that Indian students continue to drop out of school at disproportionately high rates. This can be seen by comparing the proportion of total K-12 enrollment which is American Indian with the proportion of the senior high enrollment which is Indian. Such a comparison is not conclusive, but tends to suggest a higher dropout rate among Indian than non-Indian students. The following chart presents such a comparison for four districts included in this study.

District	% Indians in K-12 Enrollment	% Indians in 10-12 Enrollment
Bagley	17.3%	11.1%
Mahnomen	36.4%	23.7%
Minneapolis	5.8%	4.2%
Morton	14.1%	8.3%

The need to address the problem of Indian students dropping out of school is widely recognized, and, no doubt, will continue to be the subject of programs, studies, and reports.

The comparison between junior and senior high school math course enrollments is also interesting when the data from the cooperating districts is studied. In the districts for which data is available--Anoka, Minneapolis, and Stillwater--the analysis indicates that virtually 100% of the Indian students in grades 7-9 were enrolled in some type of mathematics course. However, in grades 10-12, the proportion is only about 33%. No doubt this drop in math enrollment at the senior high level is due to the lack of state requirements and to school district policies which make mathematics courses elective choices in the senior highs.

An analysis of the content of the meetings between personnel of the cooperating districts and the project staff indicate an existing awareness of the need for special academic programs for Indian students. For the most part, these programs are addressed toward remedial needs which are perceived to be great. Indications of this are the rank-ordered results of the Indian needs assessments provided by St. Paul and Minneapolis. Both Minneapolis and Bagley did also indicate the existence of special programs designed to encourage more students, including Indian girls, to enroll in advanced mathematics courses.

Finally, an analysis of the data provided by the State Department of Education's MINCRIS reports was made. The statistical procedure which

was employed was the three-way chi square test. The purpose of this analysis was to determine whether the number of students who fell into each of eight categories formed by the cross-classification of race x sex x advanced math enrollment deviated from that which would be expected, if all things were equal. The following chart presents data on the observed frequencies and computed expected frequencies for each of the eight categories. This is data from the ten participating districts, taken together.

Race x Sex x Advanced Math
Combination Table,
Ten Participating School Districts

Description	Observed Frequency	Expected Frequency
Indian, male, adv. math	67	144.30
Indian, male, no adv. math	2,254	2,209.30
Indian, female, adv. math	42	134.35
Indian, female, no adv. math	2,182	2,057.05
Non-Ind., male, adv. math	4,364	4,190.05
Non-Ind., male, no adv. math	64,011	64,152.23
Non-Ind., female, adv. math	3,897	3,901.30
Non-Ind., female, no adv. math	59,703	59,731.08

N=136,520 df=1

χ^2 (Race x Sex) = .967	not statistically significant
χ^2 (Race x Adv. Math) = 113.817	significant at .01 level
χ^2 (Sex x Adv. Math) = 4.75	significant at .05 level
χ^2 (Race x Sex x Adv. Math) = 6.114	significant at .05 level

These results indicate that the proportion of girls and boys attending school is about the same for Indians and non-Indians. Yet the proportion of males enrolled in advanced mathematics courses was significantly higher than the proportion of females. Likewise, the proportion of non-Indians enrolled in advanced math was significantly higher than the proportion of Indians. Furthermore, the interaction of

race and sex with advanced math enrollment was significant, with Indian females being proportionately the most underrepresented group in those classes.

A similar statistical test was run using the MINCRIS data for the entire state of Minnesota. The following chart presents the observed frequency and expected frequency data for the state as a whole.

Race x Sex x Advanced Math Combination Table, State Totals

Description	Observed Frequency	Expected Frequency
Indian, male, adv. math	212	311.91
Indian, male, no adv. math	5,362	5,314.65
Indian, female, adv. math	169	313.16
Indian, female, no adv. math	5,229	5,013.90
Non-Ind., male, adv. math	22,495	21,867.46
Non-Ind., male, no adv. math	349,605	350,176.35
Non-Ind., female, adv. math	20,269	20,632.63
Non-Ind., female, no adv. math	330,642	330,369.40

N=733,983 df=1

χ^2 (Race x Sex) = 1.903 not statistically significant

χ^2 (Race x Adv. Math) = 116.490 significant at .01 level

χ^2 (Sex x Adv. Math) = 25.305 significant at .01 level

χ^2 (Race x Sex x Adv. Math) = 1.202 not statistically significant

Here the results again indicate no significant difference in the proportion of boys to girls among Indians and non-Indians in the public schools. As with the ten cooperating districts, the proportion of males in advanced math course was higher than the proportion of females, and the proportion of non-Indians was higher than the proportion of Indians. For the state as a whole, the interaction of sex and race with advanced math enrollment was not statistically significant.

7.0 Conclusions/Recommendations

The data which was collected, the literature which was reviewed, and the discussions which were held all suggest that the problem which Minneapolis recognized within its own district is, in fact, wide spread. Indian students, especially Indian girls, throughout the state and the nation are failing to enroll in elective advanced mathematics courses.

Many causes are suggested for this failure. They include the attitudes of parents, teachers, and counselors; the socialization process which identifies math as a male domain; the lack of role models who are successful in math-related careers; math instruction which fails to recognize differences in learning styles; and low self-esteem due to lack of previous successful experiences.

Research about minorities/women and mathematics has tended to examine only one or perhaps two of these variables at a time. What seems to be lacking is a conceptual frame which suggests the relationship between the variables. Based on the work done in association with the project, a conceptual framework has been developed by the staff (see Figure 10). It is seen as a point of reference for additional research, whether that research attempts to deal with all or only some parts of the system. What is important is that, in fact, the variables associated with math achievement among Indian girls be understood to be systematically interrelated and likely to effect one another, as well as achievement, in systematic and predictable ways.

Besides recommending that further research be conducted using this conceptual framework to integrate the results, direct services are also needed. It is clear that Indian parents care about their children. It is also clear that many Indian adults have had only limited and often negative contacts with schools and the study of mathematics. Often these old experiences are responsible for persistent negative feelings

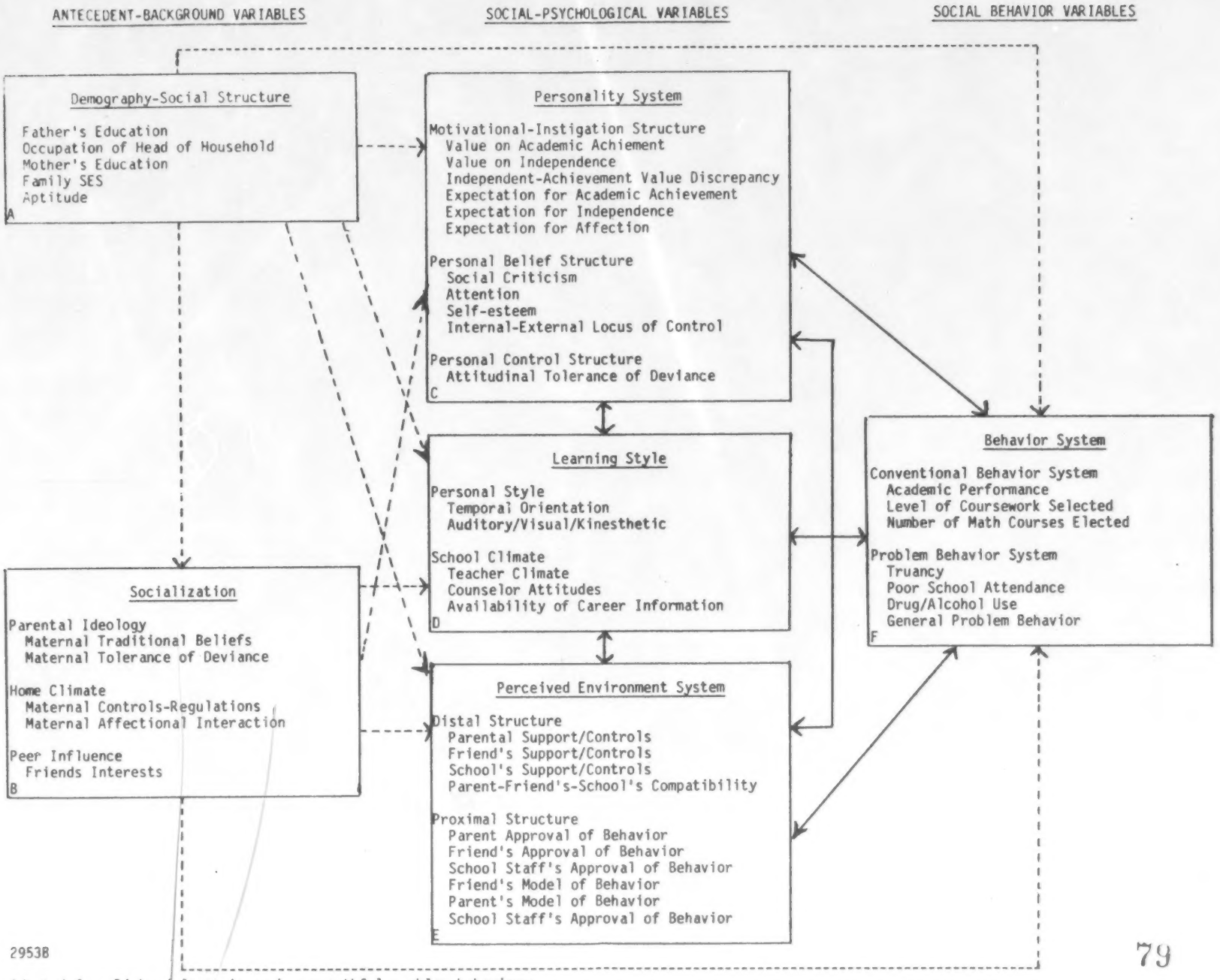
and attitudes. A great deal of emphasis is currently being placed on research and programs dealing with the family and the development of literacy. It is recommended that programs also be developed to explore the area of family involvement and the development of mathematics skills.

The literature very clearly shows that the best predictor of achievement in mathematics is enrollment in math courses. It is recommended that school districts give serious consideration to requiring all students to enroll in mathematics courses throughout their high school years. While raising the requirement will not insure enrollment in advanced courses by Indian girls, it will do much to raise expectations.

Raised expectations should also be the goal of staff development efforts throughout the public schools. Teachers and others need information on how their expectations are translated into behaviors and how those behaviors affect children. Educators also need strategies for monitoring their own classroom behaviors as well assistance in changing some of them. No longer should behavior which indicates lower expectations for women or minorities be tolerated on the part of anyone working in the schools.

Finally, there needs to be sharing of information with the Indian community so that that community can continue to grapple with difficult issues such as the extent to which feminism is compatible with tradition tribal values, the extent to which those values affect the learning styles and world views of contemporary Indian children, and how resources can be found to encourage achievement above the level of minimum competency when so many Indian children struggle just to reach the minimum. As awareness increases and interest builds, the Indian community itself will be the source of the best answers to the problem of assuring equity in mathematics for Minnesota Indian girls.

Figure 10
The Conceptual Framework for Further Research



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Adapted from Richard Jessor's work on youthful problem behaviors.